

15¢

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE

TECHNOLOGY DEPT!

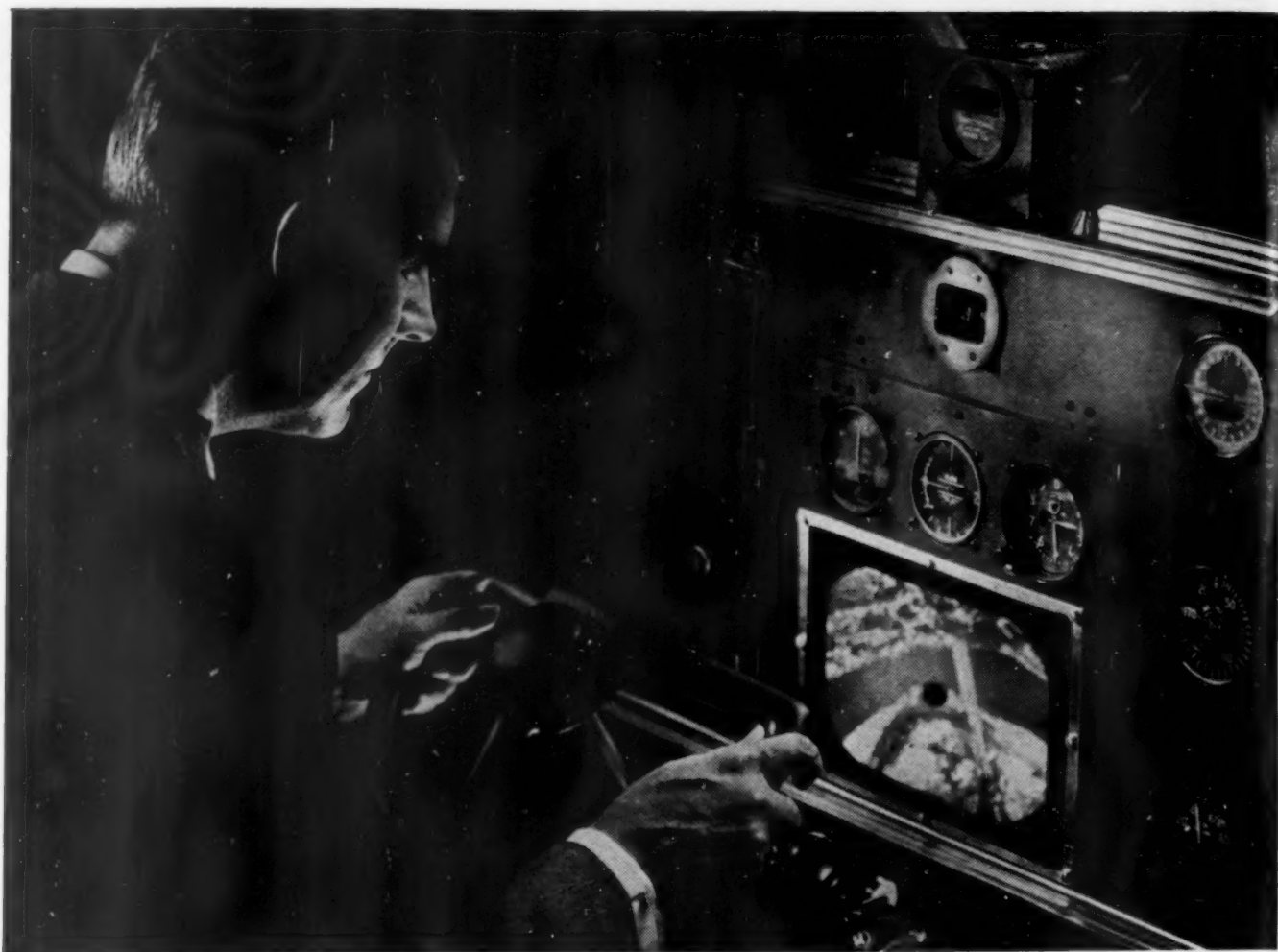
NOV 15 1945
DETROIT



Problem Solver

See Page 291

A SCIENCE SERVICE PUBLICATION



One of the many ways radar can serve aviation is by enabling the pilot to "see" through fog and darkness.

Radar—a "Moving Roadmap" for Flying

Pilots can now have an accurate radar "road map" of the earth below—showing landmarks and major details of terrain. Radar will make it a whole lot safer to fly at night or in stormy weather—as well as in broad daylight.

This is only one of the many possible uses for radar. For example, radar will "see" icebergs or islands many miles away—day or night—and enable ships to avoid them. It will provide man with an amazing new "sixth sense"—and will be used in a great many ways yet to be discovered.

RCA research and engineering played a leading role in developing radar. Similar research goes into *all* RCA products.

And when you buy an RCA Victor radio or television set or Victrola, made exclusively by RCA Victor, you enjoy a unique pride of ownership. For you know, if it's an RCA it is one of the finest instruments of its kind that science has achieved.

Radio Corporation of America, Radio City, New York 20. Listen to *The RCA Show*, Sundays, at 4:30 P.M., Eastern Time, over the NBC Network.

HOW RADAR WAS BORN

During RCA experiments at Sandy Hook in the early 1930's, a radio beam was shot out to sea. Men listening with earphones discovered that this beam produced a tone upon hitting a ship that was coming into the New York harbor.

Later on the question arose, "If radar could 'hear' couldn't it be made to 'see'?" So the viewing screen—or scope—was incorporated into radar. This scope is an outgrowth of the all-electronic television system that was invented and perfected at RCA Laboratories.



RADIO CORPORATION of AMERICA

ENGINEERING-MATHEMATICS

Mathematical Machine

New mathematics of future engineering expected from mechanical brain now released from war work; works on non-linear problems.

See Front Cover

► THE mathematics that the engineers of the future are likely to use is expected to come out of the research to be done with the new electronic differential analyzer of the Massachusetts Institute of Technology which has been released from war to peacetime work. The machine is shown on the cover of this SCIENCE NEWS LETTER.

This new mathematical robot, with 2,000 electronic tubes, several thousand relays, 150 motors and nearly 200 miles of wire in its mechanical "brain", has worked on the development of radar theory, computing range tables for the U. S. Navy guns and other war tasks.

Now it is to be used on an equally important job. It is free to turn to the task for which it was designed—creating the groundwork for the mathematics of the future.

The mathematics currently used in physics and engineering applications has been devoted to the solution of what mathematicians call "linear" problems, but it has become increasingly evident that the usefulness of these methods has been almost exhausted. They will still constitute the major body of information in handling routine problems.

But the new problems in physics, electrical engineering, aerodynamics, and similar fields seem to be primarily non-linear. Leading mathematicians admit that their principal handicap in handling such problems is that they just don't know enough about the nature of solutions to these problems to make intelligent guesses as to what they are like. From the mathematician's point of view, the major contribution of the differential analyzer and similar computing machines will be to provide the "horse-work" to build up an immense number of detailed numerical solutions to non-linear problems so that the form or shape of the general solutions will become intuitively familiar.

To solve new problems, a mathematician must develop a feel for what the solution will be like. The computing machines of the future must provide a skeleton outline of the new mathematics

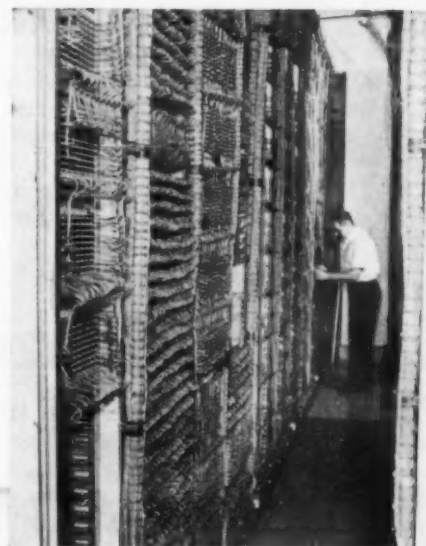
as a framework for the mathematician to construct theories which the physicist and the engineer require.

Scientific announcement of the differential analyzer has just been made in the Journal of the Franklin Institute in a joint paper by Dr. Vannevar Bush, formerly vice-president of the Massachusetts Institute of Technology, and now president of the Carnegie Institution of Washington and director of the Office of Scientific Research and Development, and Dr. Samuel H. Caldwell, director of the Institute's Center of Analysis.

The original differential analyzer, designed by Dr. Bush and his associates and built in 1931, was entirely a mechanical machine, and the solution of problems required manual setting of gears and other connections. In the new machine these settings and connections are automatically accomplished by electrical "couplings," an instantaneous process controlled by punched paper tapes. For ordinary operations the huge machine requires only one operator. The symbols of the mathematician representing the problems for which a solution is desired are translated into a "language" which the machine understands. This "language," a code punched on a paper tape, is transmitted to the machine which automatically selects the various units required for the process of computation.

Unlike conventional types of calculating machines which operate on numbers, the new differential analyzer deals with problems involving rates of change among variable quantities. The solution of a differential equation is not just a number; it is a numerical history of the concurrent instantaneous values of two or more variables. These solutions may be produced either graphically or numerically, or in both forms. A graphical solution consists of a curve drawn automatically by the machine, showing the relation between any two variables appearing in the differential equation. A numerical solution consists of a printed table of the corresponding values of the variables at any convenient intervals.

Science News Letter, November 10, 1945



LOTS OF WIRE!—A behind the scene view of the complex wiring in the new electro-mechanical differential analyzer. The machine contains 200 miles of wire, 2,000 electronic tubes, several thousand relays, and about 150 motors.

ELECTRONICS

Television in Full Color Will Soon Be on the Air

► TELEVISION pictures in full color will soon be on the air from a new installation in the Chrysler building in New York. It will be an experimental color television transmitter station to conduct propagation tests both local and long-distance. The installation follows the relatively recent successful sending of pictures in full color, not only within a laboratory, but from one building here to another several blocks away where they were received with full clarity.

Full color television employs radio waves of the new ultra high frequencies, according to Paul W. Kesten, executive vice-president of the Columbia Broadcasting System, who was probably the first to announce the successful transmission of television in color through the air. "Transmitting power of less than 1/10 the present power requirements of low frequency television transmitters," Dr. Peter C. Goldmark, television engineer of the same company, declares, will satisfactorily cover an area like New York.

Describing the color-television tests recently before the Federal Communications Commission in Washington, Dr. Goldmark pointed out that by means of an inexpensive directional antenna and

the use of the high-frequency television bands, "ghost free" reception was possible for the first time in the history of television. "Ghosts" in television are similar to echoes in radio and appear as shadows on the television screen.

The manufacture of receiving and transmission equipment for color television is already in progress. The Gen-

ELECTRONICS

Located Nazi Submarines

► THE STORY of the development of sono-radio buoys, that located Nazi submarines under the waters of the Atlantic and guided Allied destroyers to the spot for the kill, can now be told.

Visual and radar sighting served well as long as the enemy U-boats stayed on the surface but were of no value when the subs remained under water. The sono-radio buoy gave the airplane ears to hear, locate, and to follow a submerged U-boat.

The warned airplane could itself attack or call destroyers to the spot.

By relaying subsurface noises to the plane, the sono-radio buoy also made it possible to know the outcome of the attack. Sometimes the propeller beat of the U-boat as it fled the scene could be heard. Sometimes ominous break-up noises followed by silence testified to the death of the sub.

The sono-radio buoy, according to Dr. John T. Tate of the National Defense Research Committee, was a development of Division 6 of that committee, carried out under contract with Columbia University, Division of War Research, at the U. S. Navy Underwater Sound Laboratory at New London, Conn.

"The sono-radio buoy," Dr. Tate states, "was not a flash of genius springing from the brow of an inventor. Rather it was one of the results of purposefully bringing a group of trusted scientists and engineers into intimate and continuing contact with the progress and problems of U-boat warfare as it developed in the Atlantic."

The idea of the sono-radio buoy was not new, he said, but was taken from a heavy moored type of buoy, developed by the Naval Research Laboratory, for use in harbor protection where cable-connected hydrophones were not practical. But the adaptation to use a device of this sort from airplanes in U-boat warfare was new.

The problem was to develop a sono-

eral Electric Company has taken the CBS receiver developments and will turn them into commercial products. The first are scheduled to be completed by the end of January, 1946. The studio equipment developed by CBS technicians is now being manufactured by the Westinghouse Electric Corporation.

Science News Letter, November 10, 1945

radio buoy light enough to be carried in quantities by airplanes, cheap enough to be expendable, and rugged enough to withstand the shock of water entry. In addition it had to have battery-power sufficient for several hours' life, and adequate acoustic and radio range.

The floating sono-radio buoy picks up the sounds of a submerged U-boat by hydrophones which change the sound waves in the water into small electrical voltages which are amplified and converted into radio waves in the transmitter part of the buoy. Airplanes carried receivers tuned to the same frequency of the buoy transmitters.

Operators easily learned to distinguish between natural underwater sounds and foreign underwater noises. After locating an underwater craft and flashing word back to the destroyer base, the plane hovered over the spot and, by dropping additional buoys, followed the U-boat along its course.

Science News Letter, November 10, 1945

CHEMISTRY

More Efficient Method For Extracting Magnesium

► MORE efficient, hence cheaper, extraction of magnesium from sea water is promised through a newly patented method developed by two chemists employed by the Dow Chemical Company at Midland, Mich., Dr. John J. Grebe and Dr. William C. Bauman. They have assigned to their employing corporation rights in their patent, No. 2,387,898.

Although the application is new, the principle involved has been used for a long time in water-softening systems, in which the undesired minerals are seized and held fast by what is known as a base exchange agent, such as sodium aluminum silicate. Such a base exchange agent is used in the Grebe-Bauman method for extracting the magnesium from the sea water. When the concentration in the

base exchange bed has become high enough, the magnesium is dislodged by passing through what is essentially concentrated sea water—a 15% solution of sodium chloride. Partial evaporation of this brings down the common salt in solid crystals; the magnesium chloride flows out, still in solution, and may then be finally evaporated down and the magnesium extracted electrolytically.

Science News Letter, November 10, 1945

Copper sulfate is used to dull or deepen the shade of dyed leather.

SCIENCE NEWS LETTER

Vol. 43 NOVEMBER 10, 1945 No. 19

The weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N. St. N. W., Washington 6, D. C. North 2255. Edited by WATSON DAVIS.

Subscriptions—\$5.00 a year; two years, \$8.00; 15 cents a copy. Back numbers more than six months old, if still available, 25 cents. Monthly Overseas Edition: By first class mail to members of the U. S. Armed forces, \$1.25 a year. To others outside continental U. S. and Canada by first class mail where letter postage is 3 cents, \$1.25; where letter postage is 5 cents \$1.50; by airmail, \$1.00 plus 12 times the half-ounce airmail rates from U. S. to destination.

Copyright, 1945, by Science Service, Inc. Reproduction of any portion of SCIENCE NEWS LETTER is strictly prohibited. Newspapers, magazines and other publications are invited to avail themselves of the numerous syndicate services issued by Science Service.

Entered as second class matter at the post office at Washington D. C., under the Act of March 3, 1879. Established in mimeographed form March 18, 1922. Title registered as trademark, U. S. and Canadian Patent Offices. Indexed in Readers' Guide to Periodical Literature, Abridged Guide, and the Engineering Index.

The New York Museum of Science and Industry has elected SCIENCE NEWS LETTER as its official publication to be received by its members.

Member Audit Bureau of Circulation. Advertising Representatives: Howland and Howland, Inc., 393 7th Ave., N.Y.C., Pennsylvania 6-5566 and 360 N. Michigan Ave., Chicago, STAt 4439.

SCIENCE SERVICE

The Institution for the Popularization of Science organized 1921 as a non-profit corporation

Board of Trustees—Nominated by the American Association for the Advancement of Science: Edwin G. Conklin, American Philosophical Society; Otis W. Caldwell, Boyce Thompson Institute for Plant Research; Henry B. Ward, University of Illinois. **Nominated by the National Academy of Sciences:** Harlow Shapley, Harvard College Observatory; Warren H. Lewis, Wistar Institute; R. A. Millikan, California Institute of Technology. **Nominated by the National Research Council:** C. G. Abbot, Smithsonian Institution; Hugh S. Taylor, Princeton University; Ross G. Harrison, Yale University. **Nominated by the Journalistic Profession:** A. H. Kirchhofer, Buffalo Evening News; Neil H. Swanson, Executive Editor, Sun Papers; O. W. Riegel, Washington and Lee School of Journalism. **Nominated by the E. W. Scripps Estate:** Max B. Cook, Scripps Howard Newspapers; H. L. Smithton, Executive Agent of E. W. Scripps Trust; Frank R. Ford, Evansville Press.

Officers—President: Harlow Shapley. **Vice President and Chairman of Executive Committee:** C. G. Abbot. **Treasurer:** Frank R. Ford. **Secretary:** Watson Davis.

Staff—Director: Watson Davis. **Writers:** Frank Throne, Jane Stafford, Marjorie Van de Water, A. C. Monahan, Martha G. Morrow. **Science Clubs of America:** Joseph H. Kraus, Margaret E. Patterson. **Photography:** Fremont Davis. **Sales and Advertising:** Hallie Jenkins. **Production:** Dorothy Reynolds.

MEDICINE

Helps High Blood Pressure

Some patients are helped by a rigid salt-free diet. Must cook everything, including bread, at home and milk must be treated to remove sodium.

► NEW ANGLES on high blood pressure appear in two reports in the *Journal of the American Medical Association*, (Nov. 3).

A salt-free diet treatment will help some patients, Dr. Arthur Grollman and collaborators of the Southwestern Medical College report on the basis of animal studies and trials in patients.

This type of diet treatment was tried many years ago and abandoned when it failed to give good results. One reason for the failure, Dr. Grollman believes, was that the diet was not really free of salt, or rather, of sodium. It is the sodium part of salt, not the chloride, that Dr. Grollman finds important in high blood pressure control. To eliminate enough of this from the diet means patients must cook everything, including bread, at home and if they drink milk, that must be treated to remove the sodium. Not all patients, however, are helped by this diet, which also accounts in part for the failure of dietary control to attain general recognition.

Associated with Dr. Grollman in the studies were: Dr. T. R. Harrison, Dr.

M. F. Mason, Dr. James Baxter, Dr. Joseph Crampton and Dr. Francis Reichsman.

The importance of the cortex, or outer part, of the adrenal gland for the development or maintenance of essential hypertension, one kind of high blood pressure, is suggested by Dr. George A. Perera, of Columbia University College of Physicians and Surgeons.

This suggestion is based on experience with a patient who had high blood pressure and subsequently developed Addison's disease, an ailment resulting from lack of the hormone produced by the cortex of the adrenal glands. His blood pressure continued high while the Addison's disease was being treated with synthetic adrenocortico-hormone. When, however, he was treated with salt alone instead of the synthetic gland chemical, his blood pressure dropped to normal limits.

The mechanism by which the adrenal gland cortical hormone affects blood pressure is a matter for speculation, Dr. Perera comments.

Science News Letter, November 10, 1945



NEW PLASTIC—Forticel, produced by Celanese Corporation of America, is lighter, more lustrous, tougher and odorless. (See SNL, Oct. 27)

has that of the British or many of the nationalities of Europe. The Russians are very realistic, inclined to face problems frankly and are very direct.

The writings of Lenin, Hegel and Marx, Prof. Razran said, and not of Tolstoy or Dostoyevsky, are the key to understanding of the workings of the current Russian mind.

The Russians hate hypocrisy and appreciate being dealt with frankly and even with bluntness. The most frequent term of opprobrium used by Lenin against his enemies was "hypocrite." He apparently believed that calling names may be useful as a means for getting grouches off the chest. The Russians are very wary of covering up or whitewashing bad situations or assuming pollyanna or "keep-your-sunny-side-up" attitudes. They have no patience with empty substitutes. Russian soldiers have no pin-up girls.

Russians think a great deal about their ideals and principles. And they are always trying to figure out and appraise the ideals of other people. If our own diplomats do not define our principles to the Russians, they will attempt to define them for us, Prof. Razran pointed out. The reason that the late President Roosevelt was greatly admired among Russian leaders was due to FDR's reputation in Russia as an idealist.

Russians are extremely proud of and sensitive to criticism of their country, but are very modest, even self-effacing about their individual achievements. The Amer-

PSYCHOLOGY

How Russians Think

They make heated claims but later cool off; American diplomats should wait until their mood moderates and then talk business.

► WHEN the Russians make unacceptable, heated claims in an international conference, just wait patiently. Give them time and they will naturally cool off and become less emphatic. Then step in quickly and close the bargain.

This is the advice to diplomats that might be based on an analysis of Russian ways of thinking made by a Russian-born psychologist, Prof. Gregory Razran, of Queens College, New York.

Russian habits of thinking are very different from those of Americans, Prof. Razran, who has lived in this country for more than 20 years, said. Americans are likely to weigh the pros and cons of

a situation as they study it. Russians plunge forward with an idea, pursuing it with full force and enthusiasm to the neglect of any other point of view and then later, sometimes quite suddenly, begin to consider the other side of the question.

Americans in a debate will say, "Yes—but . . ." Russians say, "No. No! NO!—well, yes." When they are in the "No" mood nothing is to be gained by protest or argument; better wait until they lose their steam.

In some ways, Prof. Razran explained, Russian thinking has much more in common with American thinking than

ican who praises the individual but disparages the Soviet system gives serious offense to his Russian friend.

Russians have a high regard for technology, science and intellectual achieve-

ment in general. For this reason, probably the best emissaries for promoting goodwill between the two nations are the scientists and engineers.

Science News Letter, November 10, 1945

PHYSICS

Sensory Aid for Blind

Will permit its user to locate all obstacles within a radius of 20 feet by using a photoelectric cell and a beam of light.

► **SUPPLANTING** the blind man's white cane and seeing-eye dog, a sensory aid device, under development by the Army Signal Corps for six months, will permit its user to locate all obstacles within a radius of 20 feet by means of a photoelectric cell and a beam of light, it was announced by Maj. Gen. Harry C. Ingles, chief signal officer of the Army.

At present not sufficiently perfected for practical use, a nine-pound experimental model, turned slowly from side to side in the path of the user, detects objects within a 20-foot range and conveys the distance in a coded tone signal by means of an earphone to the user.

Designed by Lawrence Cranberg, physicist, the experimental model's three-watt lamp beams a narrow finger of light through a focusing lens in the front of the case, in a ray about two inches in diameter. Upon striking an object, the ray is reflected back through a second lens in the front of the case, which refocuses the beam in a tiny point of light to the receiving unit, consisting of a revolving disk mounted in front of the photoelectric cell. The disk is divided into five concentric rings, containing one or more holes to permit the ray of light to strike the photoelectric cell. The angle of the reflected beam, changing with the distance of the object from the device, strikes the inner concentric ring of the disk at the maximum range of 20 feet, and moves downward on the disk as the object nears. The inner ring contains only one small hole, and as the disk moves at the rate of one revolution per second, the light would strike the photoelectric cell for an extremely brief period of time in each revolution. The energy, created by the photoelectric cell as the light reaches it, is relayed to the earphone by a standard commercial hearing aid, giving the code tone. An object five feet distant would reflect the ray of light to the fourth concentric

ring, which has one small and one large hole, giving a signal of one long and one short tone, as in the dot-and-dash of the Morse code.

The five rings indicate approximate distances of three, five, eight, 11 and 20 feet from the user to the object. With practice a blind person could determine exact distances by the overlapping of the signals as the light strikes areas between the rings.

The problem of filtering out disturbing signals from sunlight and ordinary electric lights was solved by an amplifying system sensitive only to modulated or "pulsed" light, and then modulating the light ray to that frequency.

Further development programs in supersonic and radar waves are also being conducted by the Signal Corps.

Science News Letter, November 10, 1945

ORNITHOLOGY

British Radar Clocks Invisible Flying Geese

► **WILD GEESSE** flying at night have been tracked by radar operators on the eastern coast of England, so accurately that their ground speed could be measured, it is reported by David Lack and G. C. Varley of the Army Operational Research Group, Ministry of Supply, (*Nature*, Oct. 13). Radar pick-ups of bird flocks were made as early as 1941, and similar occurrences have been reported from other countries, including the United States; but it is only now that wartime restrictions on publication of the information have been lifted.

Longest radar track on a flock of geese thus far recorded was one made by a station of the R.A.F. on the coast of East Anglia. The birds were kept in the radar field for 99 minutes, during which time they flew 57 miles—an average of 35 miles an hour. Another station picked up the same flock and tracked them for an additional 22 miles,

at a ground speed of 33 miles an hour. The geese were never seen, but when they crossed the coast near a Royal Observer Corps post they were identified by their call as gray geese.

Gulls as well as geese have been picked up by radar, and even small birds traveling in flocks. Experimental proof that birds actually do produce radar echoes was produced by suspending a dead gull beneath a balloon and "radaring" this known target. The echo from the bird's body could be clearly distinguished from that produced by the balloon.

When approaching flocks of birds were first detected by radar it created some confusion, but this did not last long because of the great difference in speed between even the fastest of birds and the slowest of airplanes. Birds continued to create some disturbance, however, because their speed is close to that of fast surface craft. During the war, birds gave rise to several E-boat scares and to at least one invasion alarm.

Science News Letter, November 10, 1945

PHYSICS

Nazis Used Infra-Red Rays To Detect Fighting Tanks

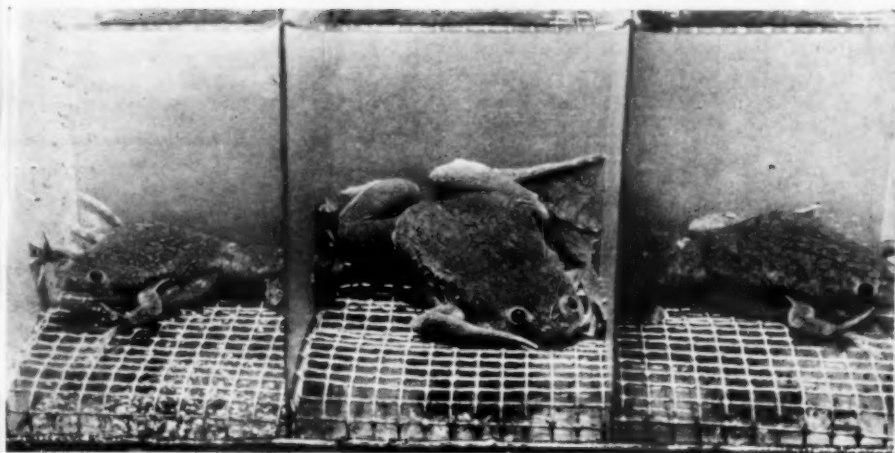
► **INFRA-RED** rays were used by the Germans during the latter days of the war to detect Allied fighting tanks at night, it is now revealed. Since infra-red rays are not visible to the human eye, the Allied tankmen did not know they were being illuminated.

This is one of the startling advances made by German scientists that might have prolonged the war if the Nazis had been able to hold out a few months longer, according to Dr. Charles F. Green, of the General Electric Company, who recently returned from Germany where he served on an Army mission.

The infra-red rays were the results of infra-red filters positioned on German searchlights. If these filtered searchlight beams hit the Allied tanks, they bounced back to devices known as "bildwandlers," or "image changers," mounted on German tanks. These devices transformed the infra-red rays into an image of the opposing tank, Dr. Green states, and the gunners opened fire.

Research in German laboratories, and the use of that knowledge in making armaments, according to Dr. Green, were coming ahead so fast at the end of the war that the Allies' margin of superiority was rapidly decreasing.

Science News Letter, November 10, 1945



ODDEST TOADS—*Xenopus* toads in their laying cage. The netting is to prevent them from eating their own eggs. Note the extremely wide, webbed hind feet, tiny, hand-like forefeet; also absence of eyelids.

ZOOLOGY

World's Oddest Toads

Are being used for pregnancy tests which require only four to 12 hours instead of 48. Are completely unlike the "regulation" toad.

► WASHINGTON is the temporary home, just now, of a colony of the oddest toads in the world. They are as completely unlike the "regulation" toads that all of us know as can well be imagined. They haven't any warts. They don't sit blinking their eyes while they wait for a chance to snare an insect with a lightning-like snap of a long tongue, because (a) they are as completely aquatic as catfish, so they never sit on anything, (b) they haven't any eyelids, so they can't blink, (c) they haven't any tongues at all. Being so unlike the familiar, land-dwelling toads and even more water-loving than frogs, they are often called toads; but zoologists still classify them as toads.

They come from Africa, and their formal name is *Xenopus laevis*. Familiarly, they are sometimes called clawed toads (or clawed frogs) because there are sharp little claws on three of the toes of each foot, paddle-like hind foot.

Most of them are at present in the U. S. Fish and Wildlife Aquarium, under the main lobby of the Department of Commerce building. Some, however, have been placed on public display at the National Zoological Park, and there are other collections also in New York, Chicago and Philadelphia.

They are here on business—medical business. Physicians use them instead of the Aschem-Zondek pregnancy test, because it requires only four to 12 hours instead of 48 hours. If a little body fluid from a woman who thinks she may be going to have a baby is injected into a female *Xenopus* with a hypodermic syringe, and the toad begins to lay eggs, the test is positive. More than 1,000 such tests are now being made each month.

The toads were brought to this country by a Merchant Marine officer, Lt. Jay E. Cook, of New York. On his wartime cruises, he made contact with a good source for wholesale toad exports in Africa, and arranged to have a shipment of 3,000 of them sent. Of these, 2,822 made the long voyage successfully—a very good score. Another shipment, of 2,000 animals, is on the way.

Lt. Cook feeds his toads on ground beef hearts, mostly. They will also eat liver, horse meat, clams, minnows, tadpoles—even their own kind of tadpoles, for like all the frog-toad tribe they are cannibals. In their native home (which is most of Africa south of the equator) they feed on worms, drowned insects and small wiggling things that they can catch in the water. Since they have no tongues, they have to put their food into their

mouths with their small, hand-like front feet.

Although they spend their entire lives in the water, and will die like fishes if kept out of it for any length of time, they are strictly air-breathers. Consequently they swim to the top about every 10 minutes, stick the tips of their noses above the surface long enough to catch a breath, then let themselves sink to the bottom again.

There have been some proposals to grow them in this country, in the frog-farm region along the Gulf Coast. The climate there is favorable enough; nevertheless, Lt. Cook does not anticipate attempting it, for the present at least. So long as he can get a good supply from Africa, *Xenopus* will probably remain on an import basis. No one has ever suggested levying a protective tariff on toads.

Science News Letter, November 10, 1945

ELECTRONICS

Television "Eye" Sensitive To Candle-Lighted Scenes

► EXTREME sensitivity is the striking feature of a new television "eye" revealed by the Radio Corporation of America. It is a television camera tube of revolutionary design, so sensitive that it can pick up scenes illuminated only by candle or match light, or scenes with invisible infra-red rays in a blacked-out room. It is claimed to be 100 times more sensitive than conventional pick-up tubes.

In appearance the new tube, called the RCA Image Orthicon, resembles a large tubular flashlight in size and shape. It is about 15 inches long, with a shank about two inches in diameter, and a head three inches in diameter and three inches long. It has three main parts: an electron image section, an improved Orthicon-type scanning section, and an electron multiplier section in which the relatively weak video signals are magnified before transmission.

The principle on which the tube is based is known as secondary electronic emission. This involves the use of electrons from a primary source as missiles to bombard a target, or a series of targets, from each of which two or more electrons are emitted for each electron striking it. The primary source in the tube is a photo-sensitive face on which the light from the scene being televised is focused by an optical lens system.

Science News Letter, November 10, 1945

MEDICINE

**Better Treatment
For Cirrhosis of Liver**

► **BETTER** treatment of cirrhosis of the liver may come from laboratory findings of the effect of a relatively new goiter remedy, thiouracil, it appears from a report by Dr. Paul Gyorgy of the University of Pennsylvania and Dr. Harry Goldblatt of Western Reserve University. (*Science*, Nov. 2.)

Cirrhosis in rats can be prevented by adding one-tenth of one percent of thiouracil to a diet that ordinarily produces cirrhosis in these animals, the scientists found.

The chemical's effect is achieved by its interference with production of the thyroid gland's hormone. This action relieves patients with the kind of goiter due to an over-active thyroid which produces too much hormone.

The thyroid, however, has wide influence on various processes in the body, and when it is slowed, these other processes are slowed down. As a result, it may slow the rate at which the body uses its supply of the amino acid, methionine. This sparing of methionine would help cirrhosis patients, the scientists point out, because too little methionine in proportion to the amount of another amino acid, cystine, is considered the leading dietary factor causing cirrhosis.

Methionine protects the liver not only from purely dietary cirrhosis but also from cirrhosis due to poisons such as carbon tetrachloride.

The application of the rat studies, the scientists state, would be to use thiouracil "as a supporting measure in the treatment of cirrhosis in combination with a diet rich in protein and methionine."

Possibility of damage from thiouracil, for it is a chemical that must be used with care, is offset in the case of cirrhosis by the great advantage of any possible improvement in this grave condition.

Science News Letter, November 10, 1945

PATHOLOGY

**Guinea Pigs Develop
Uninvited Fatal Infection**

► **GUINEA PIGS**, those meek little martyrs of science that obligingly develop "made-to-order" infections of human germs so that new drugs like penicillin and the sulfa compounds may be tried out, can also have fatal diseases of their own, unbidden and very definitely unwanted by the scientists. A highly fatal

infection of this kind, resembling human pneumonia, has been giving trouble in breeders' stocks in the Boston area, a group of Boston medical scientists report. (*Science*, Nov. 2.) Not only do many of the animals die, but other apparently healthy ones act as immune carriers of the fatal bacteria. Sulfadiazine appears to be fairly successful in saving the lives of infected guinea pigs, but does not clear up those that were functioning as carriers of the disease.

The investigation was made by Dr. F. Homburger, Dr. Clare Wilcox, Dr. Mildred W. Barnes and Dr. Maxwell Finland, representing the Thorndike Memorial Laboratory, Second and Fourth Medical Services (Harvard), Boston City Hospital, and the Department of Medicine of Harvard Medical College.

Science News Letter, November 10, 1945

GEOLOGY

**Oil Research Center
To Be Opened in Houston**

► **A NEW** oil exploration and production research center, to be devoted to studying new methods of finding oil and getting it out of the ground, will soon be built in Houston, officials of the Shell Oil Company announced.

The million-dollar research center is expected to be completed by spring. It will house the company's recently organized division of exploration and production research, an independent entity within the Shell organization.

The research program of the new laboratory will focus attention on augmenting America's petroleum resources by developing new and more efficient methods for discovering oil and for recovering it in quantities from the underground reservoirs in which it is found. The discovery of new reservoirs is becoming increasingly difficult and large quantities of oil in present reservoirs are not being brought to the surface by present production methods, oil experts agree.

Research in physics, chemistry and geology, as they relate to petroleum exploration and production, will be carried on at the laboratory. It will also serve as an instruction center for training exploration and production field men in new techniques and methods.

Director of the new division is Dr. Harold Gershinowitz, who for the last few years has been research director of the company's manufacturing department in New York.

Science News Letter, November 10, 1945

IN SCIENCE

ENTOMOLOGY-CHEMISTRY

**DD Found Effective
Against Wireworms**

► **DD**, a kind of chemical second cousin to DDT, is the newest weapon that chemistry has added to the arsenal of agriculture for the struggle against insect pests. This compound, which is dichloropropane dichloropropylene when spelled out in full, has been found effective in stopping the ravages of soil-dwelling wireworms, in large-scale field tests conducted by W. H. Lange, University of California entomologist.

The chemical is introduced into the soil with a special drill, about 400 pounds being used to the acre, from one to three weeks before the crop is planted. The fumigating effect of the DD is sufficient to get the wireworms under control, with subsequent great increases in crop yields.

Wireworms are the hard-shelled larvae of click-beetles. There are many species of them, and practically all are destructive pests, feeding on the roots and other underground parts of plants.

Science News Letter, November 10, 1945

PUBLIC HEALTH

**First Aid Textbook
To Aid Civilians**

► **ADD TO** your list of peacetime benefits from the war a completely new and improved book on first aid, the *American Red Cross First Aid Textbook* just off the press.

Between the gray, red-cross-embellished covers familiar to thousands, many of the medical lessons of the war are brought to civilians for their use in highway, home and industrial accidents which often rival war injuries in their danger to life and limb.

The scientists on various committees of the National Research Council which sponsored and guided much medical research during the war have cooperated with surgical, medical and educational experts on Red Cross staffs in making this book up-to-date both in scientific content and as a textbook.

Prevention of accidents is stressed as well as proper first aid to accident victims.

Science News Letter, November 10, 1945

COFFEE FIELDS

CHEMISTRY

Synthetic Caffeine Produced Domestically

► **CAFFEINE**, that causes the stimulating effect in coffee, tea, soft drinks and certain medicines, will soon be in production synthetically in a vast plant to be constructed by the Monsanto Chemical Company in St. Louis. Domestic production of this synthetic caffeine will free the United States from dependency on foreign-produced natural sources.

Although scientists have long known how to duplicate the natural product's complicated molecular structure in the laboratory, caffeine until now has been derived almost exclusively from such sources as tea waste and surplus coffee, or indirectly from cocoa cake, a by-product of chocolate manufacture. The new plant will use a new process, details of which are not revealed, except that the synthetic material, simulating the process of nature, will be derived from nitrogen from the air and hydrogen from water.

Science News Letter, November 10, 1945

ZOOLOGY

Use of 1080 Restricted To Professionals

► **USE OF 1080**, the war-born super-rough-on-rats, is to be restricted to professional rodent-killers for the present at least, according to a recommendation by Dr. Ira N. Gabrielson, director of the U. S. Fish and Wildlife Service. The stuff is so poisonous to other animals, and even to human beings, that its general release for civilian use is not considered safe until after considerable further research has been done, giving a basis for precautions and regulations that will make its general distribution less risky.

The new rodenticide has been used with considerable success in cleaning up rat infestations around Army camps and in urban war centers, and also in reducing the numbers of ground squirrels and other wild rodents on rangelands in the West, where they not only destroy forage needed for livestock but also serve as potential reservoirs of bubonic plague through the presence in their fur of disease-carrying fleas.

As an example of the extreme poison-

ousness of 1080, Dr. Gabrielson mentioned one bait, in which one pound of it was distributed through two tons of grain. One-thirtieth of an ounce of this poisoned grain was enough to kill a ground squirrel—the single pound of 1080 was thus potentially able to wipe out more than 1,800,000 of the animals.

Chemically, 1080 is sodium fluoroacetate; the number is simply a convenience-designation.

Science News Letter, November 10, 1945

PHYSICS

Superfine Glass Fiber Linings for Clothes

► **SLEEPING** bags, mittens, hunting jackets and other cold-weather, out-door clothing may be interlined with down-like, superfine glass fibers similar to those used during the war for sound and heat insulation in the B-29's. These feather-soft fibers have an average diameter of only five one-hundred-thousandths of an inch.

Because the superfine glass fibers are inorganic, and contain no protein substance that can cause an allergy such as asthma, the Owens-Corning Fiberglas Corporation is exploring the possibility of using the fibers in pillows and mattresses. Bedding dust resulting from the disintegration of the organic materials usually used is considered the principal cause of distress to more than a million asthma victims.

Science News Letter, November 10, 1945

CHEMISTRY

Glass Bottles Improve Evaporated Milk

► **MARKETING** evaporated milk in glass bottles instead of the long-familiar tin cans becomes a possibility through the sterilizing machine on which patent 2,388,103 was granted to three Baltimore inventors, Dr. Randall Whitaker, Dr. Robert P. Myers and Robert E. Homberger, assignors to Sealtest, Inc. After the milk has been evaporated and filled into the bottles, the whole operation is conducted either in an atmosphere of an inert gas or under vacuum, in order to exclude flavor-spoiling oxygen. The bottles are spun rapidly in order to agitate the milk, while sterilization heating is carried on at a temperature between 280 and 300 degrees Fahrenheit for from three to five minutes. Superior color and flavor are claimed for evaporated milk bottled by this process.

Science News Letter, November 10, 1945

AERONAUTICS

400,000 Civil Airplanes Predicted for 1955

► **OVER 400,000** civil airplanes will be in use in the United States by 1955, and more than 900,000 jobs will be created by aviation.

These are predictions of the Civil Aeronautics Administration. These civil airplanes do not include commercial craft operating on regular schedules, but do include personal planes and aircraft for special jobs.

Of the 400,000 aircraft, a report states, 280,000 will be used for personal business and recreation; 40,000 by business concerns to speed up their sales and administration activities; and 80,000 by commercial aircraft services in crop-dusting, aerial photography and other non-scheduled operations.

A total of 901,300 jobs hinged around civil aviation by 1955 is predicted, a great increase over the 142,300 similar positions in 1939. Approximately 70% of these jobs will be in aircraft production and operation, the others in work derived from civil aviation.

Science News Letter, November 10, 1945

OPTICS

Polarizing Lenses Made of All-Glass

► **POLARIZED** light, that is, light in which all wave-fronts are parallel, has been produced for some time by passing ordinary light through filters containing minute crystals that have been brought into parallel alignment. Hitherto these filters have been made of plastic materials, which have to be protected against heat, scratching and other damage by sandwiching them between sheets of glass.

To overcome this production complexity, Harry H. Styll of Southbridge, Mass., has invented an all-glass polarizing lens. Into his glass mix he introduces a quantity of minute mineral crystals of suitable shape, usually crystals of tourmaline or peridot. Then while the glass is still plastic he subjects it to stretching, which brings the axes of the crystals into parallel, and hence polarizing, alignment. After hardening, the glass may be cut and ground into lenses in the ordinary manner.

Rights in Mr. Styll's patent, No. 2,387,308, have been assigned to the American Optical Company.

Science News Letter, November 10, 1945

MEDICINE

Hospital Gymnastics

Exercise may be classed as required medicine for the sick. Leg-stretcher, chest lifter, lung conditioner are only a few of the forms now used.

By LT. H. N. GARDNER, USNR

► "HEY! What is this? A hospital or a gymnasium?"

Civilians may soon be echoing the surprised reaction of many ill or wounded servicemen as returning physicians introduce into civilian hospitals methods of physical rehabilitation they have learned during the war.

For exercise is good medicine. The dramatic saving of lives by sulfa drugs, penicillin, plasma, and whole blood have captured the popular imagination; but, to the average patient, and particularly to those who are bedridden or crippled, the advances of physical rehabilitation may be the most important development to come out of this war.

Up to the present, civilian hospitals have been overworked and understaffed. They have had more than they could do to take care of their patients, and have had neither the time nor the personnel to try new ideas. But as the doctors come back from the armed forces, authorities believe that physical rehabilitation for the average patient may come to be standard treatment in all hospitals.

For Civilians Too

There will be differences, of course, between civilian and military methods. The very young and the very old cannot be given the same treatment as those of military age. And, more important, the civilian leaves the hospital sooner, and does his convalescing at home, while the soldier or sailor stays until he is ready for duty. Thus the civilian would get supervised exercise for a shorter time, and most doctors agree that few patients would keep it up at home. Some visualize a sort of "out-patient gymnasium," where patients would come back for prescribed exercises after they have left the hospital.

Particularly active in this direction is the Baruch Committee on Physical Medicine, which has recently outlined plans for community rehabilitation centers to integrate the medical, social and educational services of the community. Included in their proposal is a physical medicine center which would offer phys-

ical rehabilitation as well as the more familiar physical and occupational therapy.

Whatever happens, few medical officers think that those who have seen how even bedfast patients can keep up their strength and morale through exercise will be content to return to the old methods of "bed and boredom."

Remedial exercise, physical therapy, and occupational therapy, as methods of restoring function to injured nerves, damaged muscles, and stiffened joints, came into widespread use partly as a result of experience in the first World War. But it was not until this war that doctors came to realize the importance of physical conditioning for all types of patients.

Never before had physical training been taken so seriously by the armed forces. Soldiers and sailors were brought into top condition in training camp, and kept that way; even the brass hats left their desks for daily periods of calisthenics in the corridor.

When a man was hospitalized even for a short time, he came back cured of his disease, but far behind his buddies in physical condition. After two or three weeks in bed, arches sometimes weakened until marching, even without a heavy combat pack, was out of the question. Men had to be taken out of outfits bound for combat, or put on light duty where their intensive training for their regular jobs was wasted. So the medical officers decided to see whether physical reconditioning could safely be started during convalescence, before discharge from the hospital.

The results were surprising. The men not only went back to duty in better condition; they got well faster. Men who were literally "bored stiff" took a new interest in life as their aches and weakness faded away, and were "rarin' to go" at a time when they would otherwise have been sitting listlessly around the convalescent wards.

Encouraged by this success, medical officers began giving exercise earlier and earlier in the course of treatment, until today a majority of military patients find themselves doing sit-ups or up-side-down bicycling even before they are allowed out of bed. A man with part of his body

in a cast, or with a leg paralyzed, puts the rest of his muscles through their paces every day; even if he can only wiggle his fingers and toes, he does that regularly, and takes more and more exercise as his condition improves. Only if he is critically ill, or has a fever, will he be excused. Even if he has just been operated on, he can still do some exercises safely, and his recovery will be faster because of it.

"But isn't it dangerous?" many people ask, remembering that bed rest and quiet have always been standard treatment for most ailments.

The answer is "No"—not if it is properly supervised. Unrestricted exercise might cause trouble, it is true, but the Army or Navy doctor today prescribes exercises just as he prescribes medicines.

In the Navy's hospitals, for example, each new patient is promptly classified by his doctor in one of five groups, depending on the amount of activity he should have. The doctor checks over a list of standard exercises for that group, and crosses out any which he thinks should not be used. Then the physical training specialist takes over, holding regular exercise periods on the wards. When the patient can get out of bed, he joins a new group for more vigorous calisthenics; later on, if he is well enough, he can go in for outdoor sports, graded from horseshoe pitching and shuffleboard up to softball and touch football.

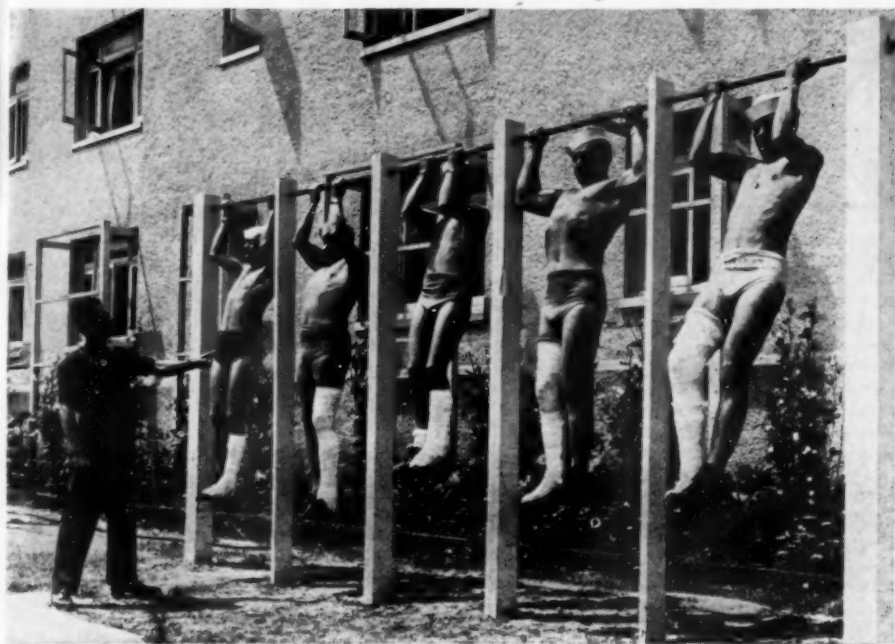
Exercise Routine

Suppose, for example, that you were a sailor or a leatherneck and had just had your appendix removed. At first you would just take it easy, getting over the effects of the operation and the ether. But after a day or two, when you were feeling better, your doctor would start you on a few simple exercises like these:

Waker-Upper: Lie on back, fists clenched beside shoulders. 1. Press head and elbows down against mattress. 2. Press harder. 3. Press still harder. 4. Relax.

Leg-Stretcher: Lie on back, with pillow folded double under knees. 1. Straighten legs forcibly, pointing toes down hard. 2. Relax. 3. Straighten legs forcibly, pointing toes up toward head. 4. Relax.

Chest Lifter: Lie on back, arms folded on bed across top of head. 1. Press head and shoulders against bed, arching upper



GOOD MEDICINE—Men with a leg in a cast exercise on chin bars. Even bed patients are expected to use special apparatus to keep them fit while getting well.

back, raising chest toward head. Keep hips on bed. 2 Relax. 3. Repeat. 4. Relax.

Lung Conditioner: Lie on back, hands on hips. 1. Inhale (chest breathing) in four counts, taking a deeper breath each count. 2. Exhale in four counts. Try to empty lungs on last count, and tighten buttocks.

Every morning and afternoon the physical training specialist would come to the ward and put you through this series twice. At first you would do each one only two or three times; later you would work up to ten or fifteen repetitions. In four or five days you would add a few exercises which take a bit more effort, but still without putting a strain on the abdominal muscles. And after two weeks, you would be using these muscles, avoiding sudden strains, but giving them a good workout in easy stages.

It is not only weakened muscles that benefit from physical training; there are other mental and physical results which can be just as important. Physical condition has a lot to do with mental health, and the outlook of both normal and neuropsychiatric patients is much improved by this program.

More unexpected are the effects in transverse myelitis cases, paralyzed from the waist down; the Navy reports that, in addition to strengthening the arm and trunk muscles to the point where these patients can get around without help, regular exercise prevents two conditions which had always troubled them—the formation of bladder or kidney stones, and decalcification of the bones of the legs and feet.

Science News Letter, November 10, 1945

AERONAUTICS

Travels 400 Miles an Hour

► **LATEST** in Grumman's line of fighting "cats," the newly developed Bearcat, sister ship to the Wildcat, Hellcat and Tigercat, is said to be superior to either the Wildcat or Hellcat in both speed and maneuverability.

Although lighter by about a ton and a half than the Hellcat, the Bearcat, designated as the F8F, has the typical Grum-

man clipped wing tips, stubby fuselage and low-winged outward appearance of the Hellcat. Powered by a single-stage Pratt-Whitney radial engine, developing more than 2800 horsepower with water injection, the F8F is armed with four .50-caliber machine guns and is equipped with racks to carry rockets and bombs.

Manufactured by the Grumman Aircraft Engineering Corporation at Bethpage, Long Island, N. Y., the Bearcat is believed to be the fastest carrier-based, propeller-driven fighter in the world at sea level, making over 400 miles an hour in level flight. Extreme range of 1,500 miles under ferry conditions and a rate of climb of nearly a mile a minute are claimed.

While Grumman was concentrating on carrier-based fighters, the Republic Aviation Corporation at Farmingdale, Long Island, had an experimental Army fighter flying at speeds in excess of 500 miles an hour as early as August, 1944. Of a long line of P-47 Thunderbolts, the XP-47J dispelled the fallacy that propeller-driven, reciprocating-engined aircraft could not reach a level flight speed of 500 miles an hour.

The Pratt-Whitney radial engine was equipped with a propeller-driven cooling fan in the motor cowlings, in addition to the air intake ports. The exhaust of the turbo-supercharger, jetting into the air beneath the plane, just forward of the tail assembly, is said to have added 400 horsepower to the normal thrust of the engine.

Production of the XP-47J series would have required complete retooling of the Republic plant, so only one 47J was constructed, but certain features and engineering improvements of the experimental plane were incorporated into later models of the Thunderbolt.

Science News Letter, November 10, 1945

The *myrtle warbler* receives its name from its favorite foods; the wax berries of the myrtle.

The succulent stalk by which the popular *cashew nuts* are attached to the cashew tree yields flesh and juices used in the manufacture of preserves, wines, liquors and ice cream.

THE SCIENTIST IN ACTION

by
W. H. GEORGE

A SCIENTIFIC STUDY OF HIS METHODS

This book is for those who need to do ORIGINAL thinking. CLEAR thinking. THINKING WITH A PURPOSE. Helps you to DISCOVER ideas, tells you how to DEVELOP them! Explains clearly METHODS OF WORKING to get RESULTS.

H. G. WELLS Writes To The Author "... I took up your book about a quarter to eight. At nine my parlour maid came to ask if I wanted any dinner tonight. It is now close on to midnight. But I realize now that your book is of the UTMOST IMPORTANCE and I feel tremendously lit up by it..."

Most respectfully yours,
H. G. Wells

CHOICE OF THE BRITISH
and AMERICAN
SCIENTIFIC BOOK CLUBS

354 Pages • Price \$3.00 • Postage free.
5-DAY MONEY-BACK GUARANTEE
At All Bookstores, or from
Emerson Books, Inc., Dept. 530-C, 251 W. 19th St., N.Y. 11

Do You Know?

The young *May-fly* lives in water for three years before emerging as an adult.

Milk is as *nutritious* for some bacteria as it is for man.

Frogs have longer legs than toads and lay their eggs in clumps instead of strings.

Nineteen new *diamond* deposits have been discovered in the past three years in the Ural mountains in U.S.S.R.

The Australian *button-quail* is a grass-land bird resembling, but not at all related to, the American true quail.

Plowing is the fundamental field job of all more advanced agricultural countries and requires more power by far than any other farm operation.

Nitrogen applied to *peach trees* in California resulted in increased yields, but applied to prunes gave no results over a five-year period.

The *southern shark* seldom exceeds six feet in length but its liver is large in proportion to its body and the liver oil is particularly rich in vitamin A.

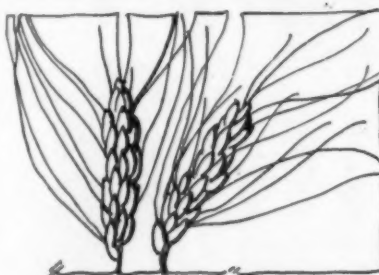
The first regularly scheduled radio broadcast was a report on returns of the Harding-Cox presidential election made 25 years ago, on Nov. 2, 1920.

Beets need more sodium than they can get from most soils; therefore common salt is used by some beet growers as a fertilizer.

Soybean meal should not exceed 10% of the total diet fed to hens producing eggs for hatching because a greater amount, it is found, may reduce the hatchability of the eggs.

Mature *corn*, which contains usually about 40% moisture, loses about 21 pounds of water per bushel in drying to a 20% moisture content when it is in condition to be put in storage.

Spices, such as sage, cinnamon, pepper, ginger, ground mustard, paprika, nutmeg and others, were provided for soldiers in relative abundance; contracts for over 1,800,000 pounds have now been cancelled.



Costly Exports

► **FAMINE** stalks in Asia, threatens to provoke rioting, even revolution, in Europe this winter. America, and other countries that have food surpluses, must come to the rescue. Practically everyone is agreed on that, public opinion polls show: even extreme nationalists and isolationists have given grudging assent—though they will doubtless make the alms-loaf bitter by passing it out with a snarl or a sneer.

Without joining that sorry company, it is still possible to point out that we can make our charity too costly to ourselves. Back in the expansive days of the late nineteenth century, when this country was a heavy exporter of grain and meat, a favorite heart-warming boast was that "America can feed the world." Our parents took pride in the departure of deep-laden grain ships, a magnified reflection of the pride of the housewife in "setting a good table."

Not for another generation did we begin generally to realize what those generous shiploads were really costing us. A half-century ago, people still talked of the "inexhaustible fertility" of our prairie soils. We saw gullies appearing in many fields, and our rivers becoming thick with mud, but not until such prophets as Hugh Bennett and Walter Lowdermilk began to cry "erosion" in the marketplace did we begin to think of the dark exports of our topsoil that went to sea along with the shiploads of flour and pork. Even now we are only making a beginning of remedial measures.

We have just finished a war in which we poured out our treasure, and lives that were dearer than treasure, without stopping to count. To ease the direct distress of this first postwar winter, we

can perhaps afford one more gesture of reckless generosity, and for one more season overplow and overplant on soils that we know will bleed anew because of it.

Hereafter, though, we must find a more effective and less wasteful way of helping our neighbor than giving him a hasty loaf when he is hungriest, and neglecting him the rest of the time. With famine as with disease and war, prevention is far better than frantic emergency efforts to cure. One of the most practical steps that can be taken is the world-wide campaign for improving food-producing methods advocated by the United Nations Food and Agriculture Organization. Show the presently inefficient farmers in famine-liable lands how to conserve their soil and at the same time stabilize their production at a higher level, and there will be less frequent need to come to the rescue with hurried shiploads of donated food. The best agricultural export this country can send out is agricultural know-how.

Science News Letter, November 10, 1945

CHEMISTRY

Cork-Like Porous Plastic For Lining Bottle Caps

► A **CORK-LIKE** synthetic substance suitable for lining bottle caps is the subject of patent 2,387,730, granted to W. L. Alderson, Jr., of Wilmington, Del., who has assigned his rights to E. I. du Pont de Nemours and Company. The invention is essentially a method for making already known plastics, the polymers of ethylene, uniformly porous. The trick is relatively simple: the polymer is heated in the presence under pressure of ethylene gas, which will of course dissolve in the mass. The pressure is partially removed, whereupon the dissolved gas forms innumerable small bubbles. Then the residual pressure is held constant while the temperature is rapidly reduced, causing the plastic to solidify in its normal elastic state, with the bubbles "frozen" in place.

Science News Letter, November 10, 1945

Chlorophyll, the green pigment of plants, is really a four-fold mixture, consisting of green chlorophyll A and chlorophyll B, and two brown pigments: carotin and xanthophyll.

In 1944 the average potency of *penicillin* was around 200 units per milligram, while today every lot is over 350 units per milligram and runs as high as 1100 units in a milligram.

WAR BARGAINS in LENSES and PRISMS



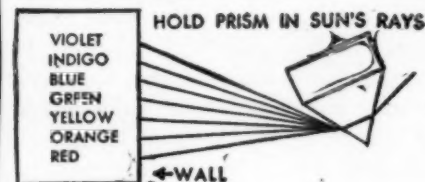
SILVERED TANK PRISM

Stock No. 3004-Q-----\$2.00 each Postpaid

PLAIN TANK PRISM

Stock No. 3005-Q-----\$2.00 each Postpaid

FOUR TANK PRISMS—Special—\$7.00 Postpaid
The most sensational bargain we have ever been able to offer.



SPECIALS IN LENS SETS

Set #1-Q—"Our Advertising Special"—15 lenses for \$1.60 Postpaid, plus 10-page idea booklet. For copying, ULTRA CLOSE-UP SHOTS, macrophotography, experimental optics, magnifying and for making a two power f/16 Telephoto Lens, "Dummy Camera," Kodachrome Viewer, DETACHABLE REFLEX VIEWFINDER for 35 mm. cameras stereoscopic viewer, ground glass and enlarging focusing aids, TELESCOPES, low power Microscopes and for many other uses.

SET #15-Q—"THE EXPERIMENTER'S DREAM"—62 LENSES, PRISMS AND OPTICAL ITEMS, AND NEW 50-PAGE BOOK, "FUN WITH CHIPPED EDGE LENSES." \$15.00 Postpaid. The variety of Lenses and Prisms in this dry eill enable you to conduct countless experiments, build a great variety of Optical Equipment. A sensational buy.

NEW 50-PAGE IDEA BOOK "FUN WITH CHIPPED EDGE LENSES"

Contains wide-variety of projects and fully covers the fascinating uses of all Lenses and in sets listed above . . . only \$1.00 Postpaid.

THICK FIRST SURFACE MIRROR—From Rangefinder—size 78 x 94 mms.—1/4" thick very flat optical glass. May have very slight scratch on chromium and aluminum coated surface. A \$60.00 value.

Stock #533-Q-----\$2.00 Postpaid

CLEANING BRUSH SET—12" flexible, plastic, hollow handle, circular construction. 4 brushes to set, range stiff to soft. Stock #504-Q (Reg. \$6.00 value)-----Price \$1.00

RAW OPTICAL GLASS—An exceptional opportunity to secure a large variety of optical pieces, both Crown and Flint glass (seconds) in varying stages of processing. Many prism blanks.

Stock #703-Q 8 lbs. (Minimum weight)-----\$5.00 Postpaid

Stock #702-Q 1 1/2 lbs.-----\$1.00 Postpaid

MAGNIFIER SET—5 magnifying Lenses—Powers from 1 to 10.

Stock #1026-Q-----\$2.00 Postpaid

RETICLE SET—5 assorted, engraved reticles from U. S. Gun sights.

Stock #2035-Q-----\$1.00 Postpaid

TANK PRISMS

In order that the tank driver shall not get shot in the face, 2 of these Silvered Prisms are used to make a Periscope. We have secured a number of these that are very slightly chipped, making possible their sale at a very low price. They are 90-45-45 degree Prisms of huge size—5 3/4" long, 2 1/2" wide, finely ground and polished. Used to build a Periscope . . . excellent also for experiments, classroom demonstrations. Some of our ingenious customers have used these prisms to make camera stereo attachment, range finder, etc. Prism easily converted into desk name plate by affixing gold letters. 100 gold letters supplied at only 10c. (Order Stock No. 3008-Q.) Normally these prisms would retail from \$24 to \$30 each.

TO SEE THE COLORS OF THE SPECTRUM hold a plain tank prism in sun's rays as shown in drawing. White incident light which passes through prism is thus broken up into a band of primary colors known as the spectrum—a beautiful sight! By looking through a tank prism at a certain angle you can see a world of colors everywhere. Truly amazing!

ALL THE LENSES YOU NEED TO MAKE YOUR OWN TELESCOPE!

ALL ARE ACHROMATIC LENSES

GALILEAN TYPE—Simplest to Make but has Narrow Field of View.

Stock

#5018-Q—4 Power Telescope-----\$1.25 Postpaid

#5004-Q—Small 2 Power Pocket Scope-----\$1.00 Postpaid

TERRESTRIAL TYPE—Have Much Wider Field of View than Galilean Type..

Stock

#5007-Q—11 Power Telescope-----\$3.20 Postpaid

#5008-Q—20 Power Telescope-----\$3.45 Postpaid

#5009-Q—40 Power Telescope-----\$7.45 Postpaid

PRISM TELESCOPES—Uses Prism instead of Lenses to Erect Image and are much shorter than Terrestrial Type. Have wide field of view.

Stock

#5010-Q—6 Power Telescope-----\$3.00 Postpaid

#5011-Q—11 Power Telescope-----\$3.25 Postpaid

#5012-Q—20 Power Telescope-----\$7.25 Postpaid

PRISMS: If you mount right angle Prism in front of Camera Lens and point camera straight ahead, you can take shot to left or right side without subjects knowledge. Technique successfully used by famous Press Photographers.

Stock No.	Type	Base Width	Base Length	Price
3040-Q	Right Angle	33 mms.	23 mms.	\$ 1.00
3042-Q	Right Angle	41 mms.	40 mms.	1.00
3045-Q	Right Angle	70 mms.	168 mms.	8.00
3001-Q	Lens Surface	20 mms.	14 mms.	2.00
3006-Q	Porro-Abbe	9 mms.	9 mms.	.25
3009-Q	Porro	52 mms.	25 mms.	1.00
3010-Q	Porro	43 mms.	21 mms.	.50
3016-Q	Pentagon	45 mms.	22 mms.	.75
3029-Q	Dove	16 mms.	65 mms.	1.25
3036-Q	80 Degree Roof	60 mms.	36 mms.	4.00
6136-Q	Rhomboid	20 mms.	17 mms.	.50
3049-Q	Right Angle	69 mms.	167 mms.	10.00
3047-Q	Right Angle	53 mms.	103 mms.	4.00
3038-Q	Roof Prism	18 mms.	34 mms.	2.50

All items Finely Ground and Polished but Edges Slightly Chipped or Other Slight Imperfections Which We Guarantee Will Not Interfere with Their Use. Come Neatly Packed and Marked. Excellent for Xmas Gifts.

TO KEEP POSTED on all our new Optical Items, send 10c and your name and address to get on our regular "Flash" mailing list.

16 MM PROJECTOR CONDENSING LENSES—Consists of two Condensing Lenses with combined F.L. of one inch.

Stock #4026-Q-----\$1.00 Postpaid

8 MM PROJECTOR CONDENSING LENSES—Consists of two Condensing Lenses with combined F.L. of 1/2 inch.

Stock #4027-Q-----\$1.00 Postpaid

35 MM KODACHROME PROJECTING LENS SET—Consists of Achromatic Lens for projecting, plus a Condensing Lens and piece of Heat Absorbing Glass with directions.

Stock #4025-Q-----\$1.95 Postpaid

LENS FOR KODACHROME EYE-VIEWER—Color corrected cemented Lens 35 mm. diam., 2 inch F.L.

Stock #6129-Q-----\$1.00 Postpaid

14-POWER COLOR CORRECTION MAGNIFIER SET—Consists of 2 perfect 18 mm. diam. Achromatic Lenses and section of metal tubing for mount.

Stock #1044-Q-----\$1.55 Postpaid

OPTICS FROM 4-POWER PANORAMIC TELESCOPE—Excellent condition. Consists of Objective Prism, Dove Prism, Achromatic Objective Lens, Amici Roof Prism, Eye Lens Set (. . . a \$60.00 value)

Stock #5016-Q-----\$6.00 Postpaid

MONOCULAR SETS OF LENSES AND PRISMS

From Navy's 7x50 Binocular. All the optics you need to make a 7 Power Monocular. (Buy 2 sets to make a Binocular.) Complete Directions included.

Stock #5101-Q-----\$5.00 Postpaid

SPECTROSCOPE SET . . . These sets contain all Lenses and Prisms you need to make a Spectroscope plus FREE 15-page Instruction Booklet.

Stock #1500-Q Hand Type Spectroscope-----\$3.45 Postpaid

Stock #1501-Q Laboratory Type Spectroscope-----\$6.50 Postpaid

MICROSCOPE SETS

Consisting of 4 Cemented Achromatic Lenses for making a 40 Power Pocket Microscope or 140 Power regular size Microscope. These color corrected Lenses will give you excellent definition and may be used for Micro-photography.

Stock #1037-Q-----\$3.00 Postpaid

Consisting of Prism, Mirror and Condensing Lens. These used together with Stock #1037-Q will make an excellent Micro-projector enabling you to get screen magnification of 400 to 1000

Power according to screen distance.

Stock #1038-Q-----\$2.00 Postpaid

TANK PERISCOPE

Complete Set Mounted Components

Rugged, strong, originally constructed for U. S. Tank Corps. Consists of 2 fine Periscope Mirrors mounted in metal and plastic. Perfect condition. Only plywood body frame is required to finish this exceptional periscope. First surface mirror is well protected by glass windows. Set weighs 2 3/4 lbs. Overall length of mount 6 1/4", width 2 1/4". Would normally retail at \$40 to \$50.

Stock #700-Q \$3 Complete Set Postpaid

TWO SETS (4 UNITS)-----\$5.50 Postpaid

ORDER BY SET OR STOCK NO.

SATISFACTION GUARANTEED

IMMEDIATE DELIVERY

EDMUND SALVAGE COMPANY, P. O. Audubon, New Jersey

AERONAUTICS

Aerial Attacks Evaluated

German submarines, planes, oil and transportation were wiped out one by one. Report includes military, economic and morale effects.

► A SCIENTIFIC and strategic evaluation of the effects of the aerial attacks on Germany by the Allied air forces during the war is given in an official over-all report released by the U. S. Strategic Bombing Survey headed by Franklin D'Olier, with Charles C. Cabot as secretary. The Survey, with civilian officials, was established in November, 1944, by the Secretary of War, and its headquarters was in London. It covers military effects, economic effects, and effects on the morale of the civilian population.

The report includes data on bombing activities, but states, "Of far more significance than statistics of strength and damage is the outstanding fact that the Allied Air Forces won the air war over Germany and obtained mastery of the skies of Europe." Because of this, Germany was fatally weakened because it was denied such vital military needs as oil, planes and tanks.

The Survey, with a staff of 300 civilians, 350 officers and 500 enlisted men, secured first-hand information on damages in Germany from bombs by inspection and from captured German reports. Members of the staff also interviewed captured officers, including members of the German General Staff.

In the spring of 1943, the report states, Allied naval and air power scored a definite victory over German submarines. After that, "submarines were dropped from first priority and the German aircraft industry was substituted.

The German ball-bearing industry, the supplier of an important component, was selected as a complementary target."

An adequate supply of anti-friction bearings was correctly assumed to be indispensable for German war production.

After a reduction in German air power through destruction of planes, oil became the priority target in the German economy. "The German oil supply was tight throughout the war," the report declares, "and was a controlling factor in military operations."

"The chief source of supply, and the only source for aviation gasoline, was 13 synthetic plants together with a small production from three additional ones that started operation in 1944," the statement continues. Because of air attacks, production from the plants declined steadily and by July 1944 every major plant had been hit. "The Germans viewed the attacks as catastrophic."

The attack on the synthetic oil plants cost Germany also its synthetic nitrogen and methanol supply and a considerable part of its rubber supply. The nitrogen was indispensable in the manufacture of explosives, and also in fertilizer to produce essential food. Methanol was needed for TNT, hexogen and other high explosives.

"The attack on transportation was the decisive blow that completely disorganized the German economy," the Survey reveals. "It reduced war production in all categories and made it difficult to move what was produced to the front. The attack also limited the tactical mobility of the German army."

Germany entered the war with an excellent railway system. It was generally adequate for the demands placed upon it until the spring of 1944. The heavy attacks in September and October 1944 on marshalling yards, bridges, lines, and on train movements, produced a serious disruption in traffic over all of western Germany.

Science News Letter, November 10, 1945

Boron, a little-known but common non-metallic element, may be used to increase the hardness of steel and is used in certain alloy steels during the war scarcity of chromium, nickel and manganese.

Clip and mail this Coupon

To SCIENCE NEWS LETTER, 1719 N St., N.W., Washington 6, D. C.

☐ Start my subscription to SCIENCE NEWS LETTER for ☐ 1 year, \$5
☐ Renew ☐ 2 years, \$8
 (No extra postage to anywhere in the world)

To CHEMISTRY, 1719 N St., N.W., Washington 6, D. C.

☐ Start my subscription to CHEMISTRY for ☐ 1 year, \$2.50
☐ Renew ☐ 2 years, \$4.00

To THINGS of SCIENCE, 1719 N St., N.W., Washington 6, D. C.

☐ Enter my membership in THINGS for ☐ 6 months, \$2
☐ Renew ☐ 1 year, \$4

To SCIENCE CLUBS OF AMERICA, 1719 N St., N.W., Washington 6, D. C.

☐ Send me information on organizing a science club.
☐ Enroll me as an associate of Science Clubs of America, 25 cents is enclosed.

Name _____
 Street Address _____
 City and State _____

FORECAST THE WEATHER



Diameter 5 1/2 inches



A scientific instrument that gives you a more accurate prediction from the reading of your own barometer.

Postpaid \$1.00 in U. S. A.

W. H. REDDING

5105 Newhall St.

Philadelphia 44, Pa.

Books of the Week

► **AERIAL NAVIGATION** students will find much of value in **AIR NAVIGATOR**, by Charles Mattingly. It is primarily a training text for instructional purposes, and a reference source for professional navigators. (Ziff-Davis, \$6.)

Science News Letter, November 10, 1945

► **THE DOZEN** years that have elapsed between the publication of the first edition of A. S. Romer's **VERTEBRATE PALEONTOLOGY** and the appearance now of the second have seen very great progress in the particular field of science covered by this book. With the numerous revisions necessarily incorporated, it is practically a new work, and more valuable than ever to the student. (Univ. of Chicago Press, \$7.50.)

Science News Letter, November 10, 1945

► **DESPITE** much good writing to the contrary, "germs" still connote "disease" to too many people. **MICROBES OF MERIT**, by Otto Rahn, tells in lively and entertaining fashion (but without distorting the facts) the story of bacteria as ripeners of food, promoters of industrial processes, capturers of nitrogen and general improvers of the soil through beneficial decay. Anyone who dreads all germs as he hates all snakes should have this book presented to him—and a promise to read it exacted from him. (Cattell, \$4.)

Science News Letter, November 10, 1945

► **FRANS VERDOORN**, that indefatigable Dutch botanist who has become an outstanding American scientific publisher, again makes scientists of two continents his debtors with his compilation of papers from several score authors into one solid, informative volume, **PLANTS AND PLANT SCIENCE IN LATIN AMERICA**. Some of the material has been previously published elsewhere, notably in *Chronica Botanica*, but much appears here for the first time. The book should be a solid help in making good neighbors into better-understanding neighbors. (Chronica Botanica Co., \$6.)

Science News Letter, November 10, 1945

► **WITH ALL THE WORLD** apprehensive of hunger in the coming months, **WORLD GRAIN REVIEW AND OUTLOOK, 1945**, by Helen C. Farnsworth and V. P. Timoshenko becomes a particularly timely book. The statistical appendix by Rosamond H. Peirce gives much valuable information in little space. (Food Res. Inst., \$3.)

Science News Letter, November 10, 1945

Just Off the Press

AMERICAN PETROLEUM REFINING—H. S. Bell—*Van Nostrand*, 619 p., illus., \$7.50. Third ed., revised and enlarged.

AMERICAN RED CROSS FIRST AID TEXT-BOOK—*Blakiston*—254 p., paper, illus., 60 cents. Revised ed. Prepared by the American Red Cross for the instruction of First Aid Classes. (See p. 296)

AVIATION: What Everyone Should Know—Devon Francis—*Bobbs-Merrill*, 229 p., illus., \$2.50. What Everyone Should Know series.

BIG DISTANCE—Donald Hough and Elliott Arnold—*Duell*, 255 p., illus., \$3. The story of the fighting AAF in the South and Southwest Pacific from the days when we were beaten in the Philippines to the day when American forces came back in triumph.

ENKI AND NINHURSAG: A Sumerian "Paradise" Myth—Samuel N. Kramer—*Amer. Schools of Oriental Research*, paper, 40 p., illus., 75 cents. Bulletin of the American Schools of Oriental Research, Supplementary Studies, no. 1.

GENERAL AND PLASTIC SURGERY, With Emphasis on War Injuries—J. Eastman Sheehan—*Hoeber*, 345 p., illus., \$6.75. A reference book on modern operative methods.

HANDBOOK OF KNOTS—Raoul Graumont—*Cornell Maritime Press*, 194 p., illus., \$1.75. Illustrates and explains each of 428 knots and ties in detail.

HIGHWAY RESEARCH BOARD: Proceedings of the Twenty-fourth Annual Meeting—Roy W. Crum and Fred Burggraf, eds.—*National Research Council*, 543 p., illus., \$5.

MEN, MIND, AND POWER—David Abrahamson—*Columbia Univ. Press*, 155 p., \$2. An analysis of the mentality of a maladjusted German people and its leaders.

PHYSICAL CHEMISTRY OF CELLS AND TISSUES—Rudolf Hober and others—*Blakiston*, 676 p., illus., \$9.

PLASTICS: What Everyone Should Know—Bernard Wolfe—*Bobbs-Merrill*, 189 p., illus., \$2.50. What Everyone Should Know series.

A STUDY OF THE FISHES OF THE SOUTHERN PIEDMONT AND COASTAL PLAIN—Henry W. Fowler—*Acad. of Natural Sciences*, paper, 450 p., illus., \$7.50. Monograph No. 7.

TOWARD IMPROVING PH.D. PROGRAMS—Ernest V. Hollis—*Amer. Council on Education*, 204 p., \$2.50. Prepared for the Commission on Teacher Education.

URANIUM AND ATOMIC POWER—Jack De Ment and H. C. Drake—*Chemical Pub. Co.*, 343 p., illus., \$4. With appendix on the atomic bomb.

VAPOR ADSORPTION: Industrial Applications and Competing Processes—Edward Ledoux—*Chem. Pub. Co.*, 360 p., illus., \$8.50. Foreword by Donald F. Othmer.

Science News Letter, November 10, 1945

INVENTION

Faster Roller Makes Smoother Sheet Glass

► **SMOOTHER** sheet glass is produced by the relatively simple expedient of spinning one of the rollers that flattens the still-soft mass so fast that it carries a film of air on its surface and thereby is kept from direct contact with the hot glass, in the invention on which Dr. Manson L. Devol of Wilkinsburg, Pa.,

obtained patent 2,387,886. Direct contact with the soft, hot glass, Dr. Devol explains, changes the shape of the roller and in time erodes its surface. Protecting the roller with an air film obviates this cause of poor glass surfaces. Rights in the patent have been assigned to the Pittsburgh Plate Glass Company.

Science News Letter, November 10, 1945

CHEMISTRY

Fire-Resistant Lacquer Adds Structural Strength

► **NEW AIRCRAFT** lacquer, that will not support combustion when used on fabric-covered planes, acts as a "tautening agent and adds measurable structural strength as the covering tightens around the airframe, it is claimed.

The new material is now in production at the plant of the Monsanto Chemical Company in Everett, Mass. In addition to these properties, it combines increased weather resistance with ease of application. It is sprayed on at ordinary room temperature. Its fire-resistant property is an asset when used on the interior walls of a plane.

Science News Letter, November 10, 1945

Commercial *sponges* grow in the Mediterranean and Red Seas and in the waters off Florida and the West Indies.

Whooping cough is second among infectious and parasitic diseases as a cause of death in young children.

The *Columbia River* is the finest supply of pure cold river water in this country.

Trees in certain German forests now have little value for lumber because of the large quantities of steel fragments embedded in them.

Speak SPANISH
THIS EASY WAY ONLY 15 MINUTES DAILY



LEARN Spanish for better business or social position. Read foreign books—really enjoy travel. **CORTINA Method** "famous for over 60 years" teaches you to speak like a native. Learn quickly, easily at home "by listening" to *Cortina* records. Thousands have, why not you? You take no risk under our Five Day Approval offer. **FRENCH, GERMAN, ITALIAN** also taught by this amazing method. Write today for free book—"The Cortina Short-Cut." State language interested in.

CORTINA ACADEMY—Established in 1882
Dept. E10180 105 West 40th St., New York 18, N. Y.

• New Machines and Gadgets •

❁ **ELECTRIC HEATER**, to keep drinking trough for cattle free of ice during freezing weather, is a hollow metal disk encircled by a heating element similar to those on electric stoves. A cable attaches it to the barn lighting current. It will neither shock nor burn a cow's nose.

Science News Letter, November 10, 1945

❁ **SPECIAL BURNER**, developed to disperse fog on airfields, uses Diesel oil instead of aviation gasoline as used in the English system, the first airfield fog dispersal scheme devised. Burner operation is regulated electrically from the control tower.

Science News Letter, November 10, 1945

❁ **SMALL SCREW JACK** operated by electric motor is used on heavy aircraft to raise and lower the horizontal stabilizers. It replaces the cable arrangement between trim-tabs on the trailing edges of elevator surfaces and the pilot. The assembly, complete with motor, weighs 22 pounds.

Science News Letter, November 10, 1945

❁ **TINY** dry battery cells, 36 of which weigh a pound, provide as much service, cell for cell, as standard flashlight cells. The core of each is rolled zinc and paper tape, specially impregnated, plus a mixture of mercuric oxide and carbon. A surrounding steel jacket serves as the positive terminal.

Science News Letter, November 10, 1945

❁ **ACID-FILLED** vial, or glass ampoule, is a basic part of a new type fuse



for shells used by anti-aircraft guns. Its actual construction and operation is still a military secret. As shown in the picture, the ampoule is about the size of an ordinary Christmas tree lamp.

Science News Letter, November 10, 1945

❁ **PRESSURE-PROOF** camera and equipment, that can be used 225 feet under water to photograph sunken ships and other objects, is an electrically-operated multiple exposure instrument and can be operated from the surface by remote control. It uses standard film, filters and flashbulbs.

Science News Letter, November 10, 1945

❁ **NEW DEVICE**, called a ram pacer, is attached to a standard hydraulic testing machine used to test metals, plastics and wood where loads must be applied at exact speeds. It gives exact control at one of eight pre-set speeds by gear changes on a synchronous motor drive unit.

Science News Letter, November 10, 1945

❁ **ELECTRICAL** device to correlate fluctuations in light intensity and time in making exposures for photo engravings goes by the trade name of Totelux. An ultraviolet sensitive photo tube, which passes current proportional to the intensity of the light, is the heart of the instrument.

Science News Letter, November 10, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 284.

Don't Delay

getting that **new book** you want to read. SCIENCE NEWS LETTER will gladly obtain for you any American book or magazine in print. Send check or money order covering regular retail price (\$5 if price is unknown, change to be returned) and we will pay postage in the United States. When publications are free, send 10c for handling. Address:

Book Department

SCIENCE NEWS LETTER
1719 N St., N. W. Washington 6, D. C.

Question Box

AERONAUTICS

How have aerial attacks on Germany been evaluated? p. 302.

What plane can travel 400 miles an hour? p. 299.

CHEMISTRY

How soon will synthetic caffeine be produced domestically? p. 297.

Why is the use of 1080 restricted to professionals? p. 297.

ELECTRONICS

How did buoys locate Nazi submarines? p. 292.

ENGINEERING-MATHEMATICS

How will the mathematical robot open up entirely new fields of mathematics? p. 291.

ENTOMOLOGY-CHEMISTRY

What is DD? p. 296.

MEDICINE

What diet has been found beneficial to some high blood pressure patients? p. 293.

What new treatment for cirrhosis of the liver is offered? p. 296.

PATHOLOGY

What uninvited fatal infection have guinea pigs now developed? p. 296.

PHYSICS

What enables blind people to locate obstacles within a radius of 20 feet? p. 294.

ZOOLOGY

What toad has no warts, eyelids or tongue? p. 295.

Where published sources are used they are cited.

The imprint to the right is mailing address for your Science News Letter.

Date on lower line is expiration of your subscription.

Renew early to avoid lapse in service.

In requesting change of address please give your old address as well as the new one, at least two weeks before change is to become effective.